FAGOR

FAGOR AUTOMATION

Linear and angular encoders

THE BEST ALTERNATIVE

Linear and Angular

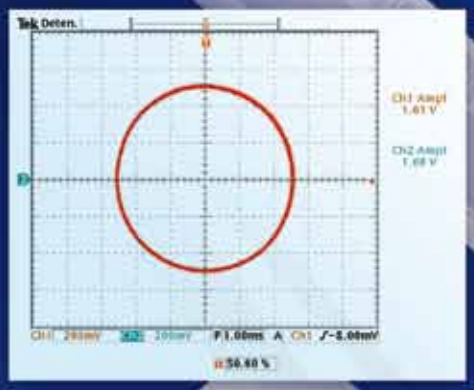
Over 30 years guaranteeing measurement and control solutions

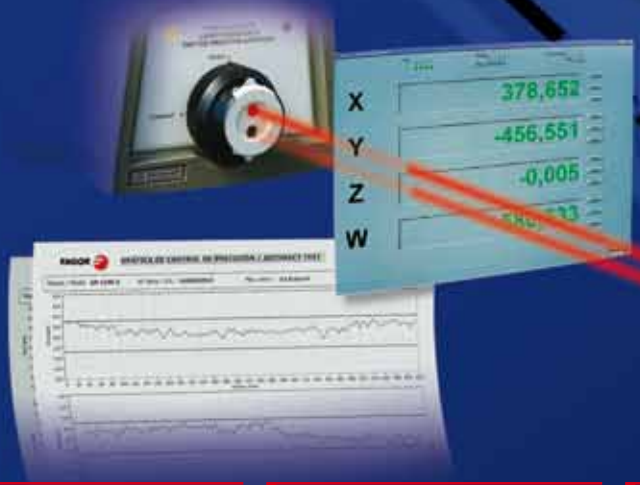
Fagor Automation has been manufacturing linear and rotary encoders with high quality and highly reliable optic technology since 1975.
Nowadays, Fagor Automation's feedback systems are the most efficient and profitable alternative to be integrated into Machine-Tools.

System test

Fagor encoders are integrated as components of a full system; this type of applications requires a thorough test on the whole system regardless of the specifications of the encoder.
The specifications shown in this catalog only apply to the specific encoder, not to the whole system.

Encoders





Optical design

Leader in measurement technologies, Fagor Automation uses transmissive and reflective optics in its range of encoders. With new scanning techniques such as single field and three-phase scanning that provide high quality signals that minimize interpolation errors.

Mechanical design

Fagor Automation designs and manufactures the most innovative and reliable measuring systems using its advanced mechanical designs. These designs using titanium and stainless steel materials provide the encoders with optimum robustness ensuring best performance in machine tool applications.

Electronic design

Fagor Automation uses latest generation integrated electronic components in their design hence achieving accurate signal optimization at high speeds and nano resolution.

Accuracy certificate

Every single Fagor encoder is subjected to an extensive final accuracy check. This control is carried out on a computerized measuring bench equipped with a laser interferometer located inside a climate controlled chamber at 20 ºC. The resulting final accuracy graph is supplied with every Fagor encoder.

Enclosed linear encoders

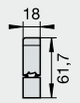
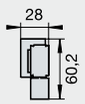
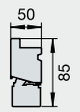
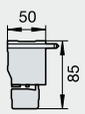
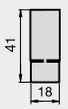
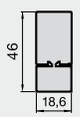
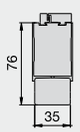
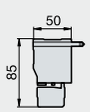
Fagor sealed linear encoders provide a robust and reliable solution for applications requiring high levels of positional control in demanding operating conditions and environments.
The mechanical, electronic and optical designs of the linear encoders ensure consistency in technical specification and functional characteristics and minimise the effect of machine errors.

Incremental linear encoders

Fagor's range of incremental encoder products optimises the balance between commercial and technical constraints. As such they provide solutions for a great variety of applications ranging from manually operated machinery to high speed automatic control systems. Signal (TTL and 1 Vpp) and connection options provide compatibility with all leading DRO and CNC applications while other operational features and options ensure reliable and consistent performance.

Absolute linear encoders

The absolute linear encoders from Fagor encompass all the benefits of the incremental encoders with the added feature of absolute position values. These absolute values are generated using optical recognition technology and data is transmitted via a variety of protocols to provide compatibility with all leading drive and CNC systems. The scales can provide sub micron resolution (up to 10 nanometers) and can operate in purely digital or in digital and analogue modes. Fagor is a pioneer in the development of optical linear encoder technology and is the first company to provide a reflective, absolute steel tape encoder with measuring lengths of up to 50 metres.

	Series	Cross section	Model	Description	Measuring lengths	Accuracy
Linear encoders for CNC machines	S			Small section	Without guide bar: 70 mm to 1240 mm	± 5 µm & ± 3 µm
	SV			Small section with incorporated support against vibration up to 20 g	With guide bar: 70 mm to 2040 mm	± 5 µm & ± 3 µm
	G			Wide section	140 mm to 3040 mm	± 5 µm & ± 3 µm
	L			For long measuring lengths	440 mm to 60 m Up to 4040 mm in a single module; with successive modules from this length on	± 5 µm
Linear encoders for conventional machines	MM			Very slim	70 mm to 520 mm	± 10 µm & ± 5 µm
	M			Small section	140 mm to 1540 mm	± 10 µm
					140 mm to 1240 mm	± 5 µm
	C			Wide section	220 mm to 3040 mm	± 10 µm & ± 5 µm
	F			For long measuring lengths	3200 mm to 30 m Up to 4040 mm in a single module; with successive modules from this length on	± 10 µm

Three-phase scanning

An optical incremental scanning system with integrated signal gain control which provides a robust feedback signal and permits high interpolation factors with minimal interpolation error.

Zig Zag technology

PATENTED by FAGOR

This innovative method reduces the effects of unwanted harmonics in the feedback signal thus providing a purer interpretation of the displacement.

Single-window scanning

PATENT PENDING

An optical single scanning method which tolerates and compensates for variations which may occur as a result of contamination or installation irregularities.

Fringe scanning

PATENTED by FAGOR

A purpose built optical array designed to optimise optical scanning and increase signal reliability.

TDMS® mounting systems

PATENTED by FAGOR

This mounting system allows reduction in the errors which can be induced into linear encoders as a result of thermal changes.

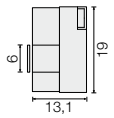
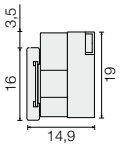
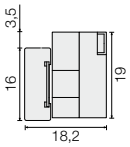
Non-contact linear encoders

Fagor's range of non-contact linear encoders integrate the experience and technologies of the sealed linear encoders in a reduced size, open linear encoder system.The commercial and technical features respond to the increasingly competitive market demands for optical linear encoders, resulting in a reliable, high performance product with the support and response expected from a reknown organisation.

Non-contact linear encoders

The non-contact linear encoder range consists of three models: EXA, EXG and EXT. The modular nature of each of these products allows them to be configured, which allows them to be matched to a diverse range of applications such as metrology, semiconductor, linear motors etc...

The technology used results in a robust and resilient solution that answers current market requirements for resolution, speed and accuracy. All interpolation electronics are incorporated into the reader head as are the dual limit detector switches and feedback alarm signal. The reference marks are synchronised and integrated into the incremental track, allowing repeatable reference searches.

	Cross section	Model	Description	Measuring lengths	Accuracy
EXA non-contact linear encoders			Self adhesive, 6 mm stainless steel tape for limited space applications	until 16 m	± 10 µm
EXG non-contact linear encoders			Guided, 10 mm stainless steel tape with intermediate fixing point for defined thermal behaviour	until 6 m	± 10 µm
EXT non-contact linear encoders			10 mm stainless steel tape for increased accuracy and linear error compensation	until 30 m	± 5 µm

Reader head

The reader head is available with 1 Vpp & TTL signals, alarm & limit signals and reference mark options, making the complete range of products adaptable to a wide range of applications.

Accessories

The non-contact linear encoder is supplied with several accessories. Magnetic actuators are used for limit switch activation and for selecting reference marks. Reader head alignment is aided by using the transparent installation slips and the signal intensity measuring device.

SIR reference marks

PATENTED by FAGOR

The SIR reference marks are optically synchronised and integrated into the incremental track. This allows even the most restricted installation spaces to benefit from the advantages of optically synchronised reference marks.

Steel-tape tensioner

PATENT PENDING

With the small tensioner, the reading head may be extracted or inserted at either end of long linear encoders without having to remove the graduated tape.

Electronics in reader head

As well as containing the optical scanning system, the reader head also houses the signal conditioning and interpolation electronics, signal alarm circuitry, reference mark selection sensor and limit sensors.

Angular encoders

Fagor angular encoders provide high resolution and high quality solutions and may be used in applications such as indexers, rotary tables with NC positioning, angular metrology, articulated spindle applications, tool magazines, tool turrets, aerials, telescopes, etc.

Angular encoders

These are some of the main features of Fagor angular encoders:

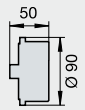
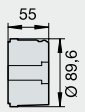
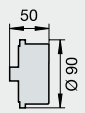
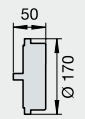
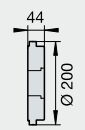
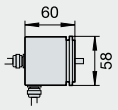
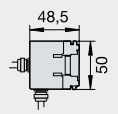
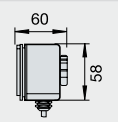
. Number of pulses: incremental between 18,000 and 360,000;
absolute 23 and 27 bits
. Accuracy of ±5", ±2.5 and ± 2"
. Differential TTL square, 1 Vpp sinusoidal signals and digital protocols
. With a solid shaft and 90 / 170 mm diameter or an incorporated flexible coupling (hollow shaft) and 90 / 200 mm diameter
. With a connector built into the encoder housing

Incremental and absolute reference marks

. One reference mark per turn
. Distance-coded I_0 reference marks throughout the whole circumference
. Absolute graduation

Alarm signal

All angular encoders with differential TTL signal offer the alarm signal /AL

	Series	Section	Model	Pulses / Turn	Type of axis	Accuracy
Angular encoders	S-D90			18000, 90000 & 180000	Solid shaft	± 5", ± 2.5" (arc-seconds)
	H-D90			18000, 90000 & 180000	Hollow shaft	± 5", ± 2.5" (arc-seconds)
	S-1024-D90			18000-1024, 90000-1024	Solid shaft	± 5" (arc-seconds)
	S-D170			18000, 90000 & 180000	Solid shaft	± 2" (arc-seconds)
	H-D200			18000, 36000, 90000, 180000 & 360000	Hollow shaft	± 2" (arc-seconds)
Rotary encoders	S			From 50 to 5000	Solid shaft	± 1/10 of the pitch
	H			From 50 to 3000 (TTL)	Hollow shaft	± 1/10 of the pitch
				From 1000 to 3000 (TTL and 1 Vpp)	Hollow shaft	± 1/10 of the pitch
	HA			From 1024 to 10000 (TTL)	Hollow shaft	± 1/10 of the pitch

Connector in housing

The angle encoder has a connector in the housing as opposed to a hard wired cable thus easing the installation procedure and providing greater flexibility with applications.

Couplings

As well as the angular encoders Fagor provide special purpose couplings that, unlike other couplings, are designed to ensure maximum transmission of accuracy while exerting minimal force and stress on the encoder shaft.

Materials

Titanium and stainless steel result in improved frequency response characteristics and signal stability over the working temperature range.

Tools

The protocol and signal evaluation device (PSED) is a test tool designed and manufactured by Fagor for diagnosis and assistance during installation and after-sales service of linear and angular encoders.

FAGOR

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Fagor Automation holds the ISO 9001 Quality System Certificate and the CE Certificate for all products manufactured.

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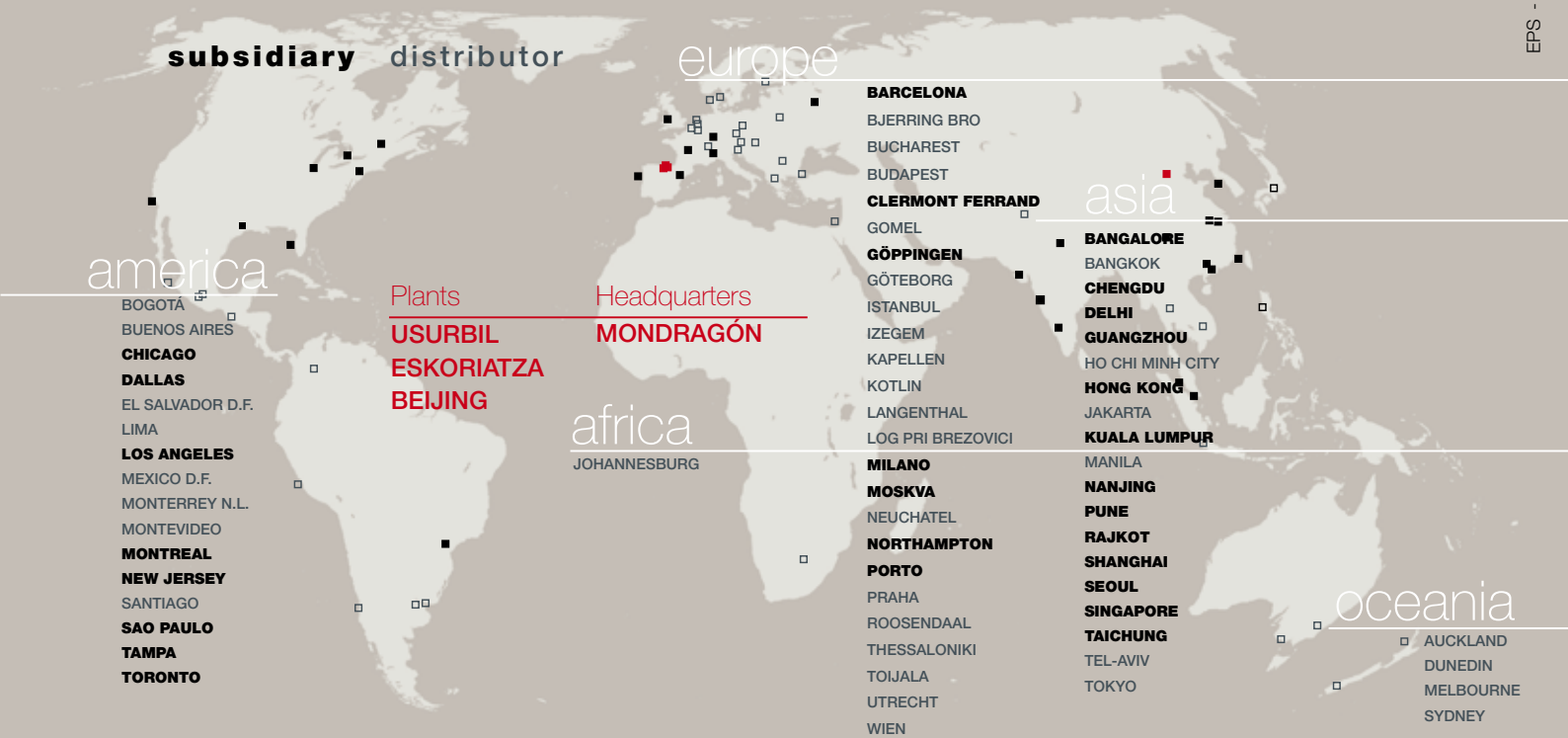
EPS - CAP EN0114



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